

NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

PATHFINDER

The Geospatial Intelligence Magazine

MAY/JUNE 2006

MORE (GEOINT) POWER TO OUR WARFIGHTERS

- >>JFCOM, NGA ESTABLISH JOINT GEOINT ACTIVITY
- >>HOLISTIC TARGETING DEPENDS ON GEOINT
- >>BRITE DELIVERS REAL-TIME IMAGERY TO THE FIELD

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ON THE COVER

A pilot in China Lake, Calif. looks out the canopy of his F/A-18F Super Hornet, one of the aircraft used to demonstrate coalition interoperability in an NGA exercise. (U.S. Navy photo)

GETTING PUBLISHED

All members of the geospatial intelligence community are welcome to submit articles of community-wide interest. Articles are edited for style, content and length. The copy deadline is the last Friday of the third month before publication. For details on submitting articles, e-mail the Pathfinder. Our address is pathfinder@nga.mil.

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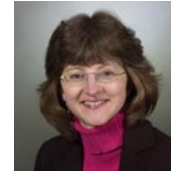
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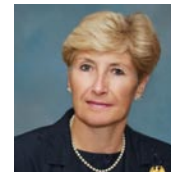
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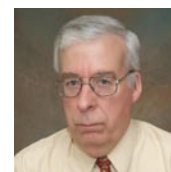
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More (GEOINT) Power to Our Warfighters

Letter to our Readers

Advances in geospatial intelligence (GEOINT) continue to boost the power of our warfighters. That's the theme of our second issue on NGA's support to them.

When our Director, retired Air Force Lt. Gen. James R. Clapper Jr., took charge—days after the attacks of Sept. 11, 2001—GEOINT had yet to emerge as a concept. Today, it is becoming not only a concept, as envisioned by General Clapper, but an intelligence discipline that has become critical to warfighter success. With his inspirational leadership, General Clapper has made an invaluable contribution in posturing NGA to make our world safer and more secure, now and in the future. Our workforce and our nation owe him a debt of gratitude as he departs the Agency in June.

That motto General Clapper introduced—"Know the Earth... Show the Way"—characterizes a challenge that our workforce take very seriously. What more do we know about the Earth and how much better are we showing the way than we did before 9/11? This issue intends to provide vivid illustrations of just what that phrase means and how far we've progressed from the vantage point of our warfighters.

Following General Clapper's farewell remarks, we begin with a message from our Military Executive, Air Force Brig. Gen. Michael Planert, who discusses NGA's new agreement with U.S. Joint Forces Command. This agreement promises to strengthen collaboration with our armed forces across the combatant commands, getting GEOINT to the warfighter faster and more efficiently, as Jennifer Colaizzi explains in an accompanying feature.

In our warfighter issue last year, we showed how NGA supported Marines in the Battle of Fallujah, providing line of sights, or view-shed analysis, to support combat effectiveness. Targeting remains a focus of this issue, but the view is "holistic" this time, in an article by Cal Hickey that provides a whole new meaning to what GEOINT has to offer in targeting.

Another focus of GEOINT—"battle space awareness"—is the subject of Paul Moskal's article on how NGA is getting real-time imagery to warfighters in theater. Feedback indicates that the capability has been received with great enthusiasm.

Warfighter support also has a human dimension, articulated so well by Scott Kather, who discusses his two deployments to Iraq in "Working in Iraq: a Great NGA Experience."

And these are just a sampling of what you'll find in this issue on our warfighter support. In the July-August Pathfinder, we'll put the spotlight on homeland defense for another look at advances in GEOINT as NGA continues to "Know the Earth... Show the Way."

Paul R. Weise

Director, Office of Corporate Relations



On My Mind

Our Accomplishments and the Challenges Ahead

By Lt. Gen. James R. Clapper, Jr., USAF (Ret.), Director, National Geospatial-Intelligence Agency

It is fitting that my last “On My Mind” column as Director appears in a Pathfinder issue devoted to NGA’s support to our nation’s warfighters. I began my tenure at NGA, then called the National Imagery and Mapping Agency, with a deep focus on warfighter support. Not only was the military the Agency’s largest customer, but I assumed my new position just after the tragic Sept. 11 terrorist attacks. Paramount to counter-terrorism missions was the provision of timely and accurate geospatial intelligence (GEOINT) products and capabilities to the defense community and its warfighters. I am proud to note that nearly five years after my tenure began, the level of excellence, dedication and immediacy our workforce brought to warfighter support remains. NGA is more committed than ever to strengthening national security, supporting counter-terrorism operations, and sustaining our nation’s services and combatant commands by providing GEOINT down to the “last tactical mile.”

When I reflect on my years of service as NGA’s Director, I think of the Agency’s many accomplishments in the realm of warfighter support. Perhaps the most conspicuous examples of our success have been our wartime contributions to the defense community. Targeting, navigation, force protection and operational planning are just a few of the areas in which NGA’s GEOINT products and capabilities have made a difference to warfighters in Operation Enduring Freedom, Operation Iraqi Freedom and additional counter-terrorism missions.

People, process and technology

We have enabled rapid decision-making on the battlefield by deploying personnel with the expertise, leadership and analytical skills necessary to quickly help warfighters interpret, understand and manipulate GEOINT products. We have developed and deployed new technologies such as our Mobile Integrated GEOINT Systems (MIGS) and various communications systems to war zones in Iraq, the Persian Gulf, Afghanistan and Africa, ensuring that our analysts can quickly develop tailored products based on operational requirements. We have also employed

advances in the GEOINT discipline, such as the integration of overhead and airborne imagery intelligence efforts with signals intelligence efforts in real time to help locate and dismantle terrorist groups.

Joint GEOINT Activity

Our accomplishments also extend beyond the battlefield. Earlier this year, we agreed to move forward with the U.S. Joint Forces Command (JFCOM) on a Joint GEOINT Activity (JGA) to enhance GEOINT among national and tactical users. The formal memorandum of understanding that we signed with JFCOM defines activities that will result in more effective GEOINT information-sharing across the military services and user domains. This partnership, along with collaborations we have developed with industry, academia, international partners and other intelligence and defense community agencies, will help to produce the cutting-edge GEOINT solutions necessary to support military operations at the strategic, operational and tactical levels.

Although my tenure as NGA’s Director is ending, I am confident that the innovation and commitment associated with the Agency’s warfighter-support capabilities

Targeting, navigation, force protection and operational planning are just a few of the areas in which NGA's GEOINT products and capabilities have made a difference to warfighters in Operation Enduring Freedom, Operation Iraqi Freedom and additional counter-terrorism missions.

will not be. There are still many challenges to address. We must continue to drive home the concept and value of GEOINT with the services and combatant commands.

Our NGA Support Teams embedded within the warfighting commands and military services have already done a lot to educate customers on the wide range of available GEOINT capabilities. However, we must always look for new ways to cultivate our warfighters'

understanding of the power of GEOINT and its potential to enable successful missions.

We must also look for new methods to ensure that our warfighters have the reduced cycle time they need to receive, understand and use GEOINT data and products. We have focused heavily on the development and promotion of Web-

enabled, net-centric ways to rapidly deliver GEOINT to our military customers, and we remain committed to developing those technologies in order to drive GEOINT down to the last tactical mile.

Over the years, I have found that one of the greatest benefits of serving as Director of NGA and working with this Agency's dedicated workforce has been the knowledge that our work makes a difference to the safety and security of our nation. GEOINT has become a critical component of the country's military and intelligence operations and a vital foundation for visualization and decision-making from the Oval Office to the battlefield. It has become a life-saving proposition. As we move toward the future, I urge NGA and its defense and intelligence partners to continue revolutionizing the nature of warfighter support. Our nation, its decision-makers, and the brave men and women out in the field will depend on it.



James R. Clapper, Jr.
Lieutenant General, USAF (Ret.)
Director

Up Front

Source Directorate Expands

By Gene Reich

NGA's "2010 Integrated Concept of Operations" identified a need for greater efficiency and interoperability in providing geospatial intelligence (GEOINT) from disparate sources. With an expanded array of sensors providing more data, customers need more tailored GEOINT as they face an increasingly complex, fast-changing global security situation.

"Reduce the 2010 Concept to the essence, and you'll find the Director's four 'Vs'—volume, velocity, variety and veracity," says Source Operations and Management (S) Director Scott White. When senior managers studied today's operating environment—ba-

sically a flurry of technologies and threats—it was clear that the traditional role of source operations—tasking imagery collection—was no longer adequate.

"Now we need to support a cycle of collecting all forms of GEOINT data, assessing the quality of this data, and creating foundation data with it," White says. Foundation data, including imagery, geographic features and elevation information, is

the basis for most of the GEOINT NGA provides to customers.

The logical outcome is a single organization that provides the total GEOINT data package to customers. To meet this vision, NGA's S Directorate recently expanded to assume functions formerly performed in other directorates.

The enlarged S Directorate integrates the collection process with the process of assessing source data and creating foundation data. "The change allows the Analysis and Production Directorate (P) to focus on knowledge management," says Joe Steel, one of the senior leaders who worked on the reorganization.

Vonna Heaton, Director of the S Directorate's new Source Assessments and Global Foundation Group, says NGA is now "postured to reach the 2010 Integrated Operations Concept by bringing together diverse and varied sources and making them more accessible to many customers." The realignment "will drive the creation of better processes and policies for collecting, analyzing and distributing GEOINT," she says.

Keith Masback, continuing in his role as Director of the Source Operations Group, says, "Source is at the vanguard of the Agency's future. We are taking multi-source and combining it with multi-intelligence (multi-INT) and putting it all together in a way that begins to realize the 2010 Integrated Operations Concept."

Functions that moved to S as part of the realignment include:

- global feature foundation data



**"Now we need to support a cycle of collecting all forms of GEOINT data, assessing the quality of this data, and creating foundation data with it."
—Scott White, commenting on the realignment of NGA's Source Directorate**



The S Directorate based its expansion on meeting the increased demands identified in the Director's four "Vs" concept.

- geospatial science functions—world geodetic system, gravity data collection and Global Positioning System support
- research library, including cataloging, reference, provision of ground photos and open-source purchases

- triangulation, digital point positioning database and orthophoto image datasets
- National imagery screening process and quality assessment
- commercial partnerships and data integrity, now in a Joint Business Office matrixed with P.

Obviously, this realignment is a considerable change for S. It also marks a positive change for the P Directorate.

"P analysts are now liberated to attack intelligence problems in more and more innovative ways," says P Director Robert Cardillo. "And analysts can now spend more time actually doing GEOINT analysis instead of searching for and collecting various sources."

"This is not the end," says White. "The reality is we're just beginning. We still need to continue to transform."

What would be the ultimate result of all this change?

"We'll know we're there," says White, "when we can smoothly complete, with P, the entire cycle: collecting all the GEOINT requirements, forming them into a comprehensive GEOINT plan, coordinating the plan, and executing the plan. When we can consistently do that, then we'll know this reorganization has achieved its strategic intent."

Up Front

NCE Reflects Transformation

By Gail Cherochak

NGA will mark a historic milestone in its continuing evolution in 2011 with the opening of a New Campus East (NCE) at Fort Belvoir, Va. In 2010, NGA will begin to close primary sites in Maryland, Virginia and Washington, D.C., consolidating most employees in the East to one location.

The new campus means more than building a state-of-the-art, secure and efficiently operated NGA headquarters, however. It is an opportunity to further unify the Agency and continue to transform the way we do business. This transformation, centered on

our GEOINT mission, will focus on our people, processes and technology.

People

In order to retain and recruit the best people, the NCE will be a state-of-the-art workplace designed, for example, with open office

environments where employees can collaborate and share their expertise. The consolidation will also reduce the need to travel between sites in the Washington, D.C. metropolitan area, putting assignments, training, all NGA organizations and other Agency resources within easy range of all employees. The outcome—improved expertise of the workforce, ready access to all NGA resources and improved abil-

ity to perform mission responsibilities—will benefit NGA, its partners and its customers.

Process

NGA's entire workforce will play a critical role in designing the new environment. Today, officers from the East and West are collaborating to help define the Agency's evolving culture and business environment. Taking that one step further, this new business environment can be turned into design features for the new campus. In conjunction with the architect, NGA officers are helping to visualize what the new campus will look like.

During the transition period when the move to the new campus begins, everyone in NGA will prepare for and assist in comprehensive mission assurance to ensure that we do not miss a beat in providing geospatial intelligence (GEOINT) to our customers.

Technology

Technology plays a critical role in our ability to perform our GEOINT mission. The new campus will collocate our technical assets, thus improving technical support, access and responsiveness, which are critical as NGA handles dramatic increases in the volume, velocity, variety and veracity of data and issues that will drive the future of GEOINT.

As NCE takes shape before our eyes, it will serve as visible evidence of NGA's transformation.

NGA's entire workforce will play a critical role in designing the new environment. Today, officers from the East and West are collaborating to help define the Agency's evolving culture and business environment.



From the Military Executive

Meeting the Warfighter's Demand for GEOINT

NGA & U.S. Joint Forces Command Partner for the Future

By Air Force Brig. Gen. Michael F. Planert, NGA Military Executive and Director for Military Support

As a pilot, commander and staff officer, I have used geospatial intelligence (GEOINT) products and services on countless occasions. From strategic headquarters, such as the National Military Command Center and Allied Air Forces Southern Europe, to tactical operations in Bosnia and points in Africa, I have seen GEOINT in action.

Despite my familiarity with GEOINT, prior to being assigned as the Military Executive—the principal military advisor to the Director, NGA—I did not fully understand or appreciate the intense demand for GEOINT products and services.

“To understand the critical nature of timely and accurate GEOINT reaching both the first and last tactical miles, one need only consider that the cost of taking no action would be paid for with the lives of America’s sons and daughters.”

In his State of the Union address last January, President Bush characterized the global war on terrorism as the “long war,” noting that America has to prepare to fight and win a long war, the right way. At NGA, we

are certainly supporting the war effort, but are also partnering for next-generation GEOINT solutions required by our warfighting customers who are and will remain decisively engaged in the “long war.”

Partnership with JFCOM

Our bottom-line focus in supporting the war on terrorism and addressing warfighter demands rests on providing

timely access to GEOINT and improving data flow from the national to tactical level and back. NGA has partnered with U.S. Joint Forces Command to form the Joint Geospatial-Intelligence Activity (JGA) as a means of bringing combatant commands, services and agencies together to assess baseline capabilities and evaluate options for enhancing GEOINT support to and from national, theater and tactical users.

NGA leadership recognizes the dynamic warfighting environment spawned by the war on terrorism. To ensure usable GEOINT is available when it is needed, NGA must achieve timeliness and accuracy simultaneously in the support we provide. The JGA is an effort based upon the critical need to meet customer demands for GEOINT through the rapid repositioning and distribution of data via close relationships and cooperation.

Understandably, there has been emphasis on delivering GEOINT to the warfighter at “the last tactical mile.” I would offer, though, that the capability to deliver GEOINT at “the first tactical mile,” to our nation’s strategic decision-makers, is important as well. The key to this vision is cooperative, mutually supporting relationships that retain a keen focus on the tenet of “moving data to people, not people to data.”

Supporting both ends of the GEOINT pipeline is not a new concept. It is, however, a joint warfighting concern and, therefore, is not an issue that can be solved in isolation by NGA, combatant commands, services or agencies. To understand the critical nature of timely and accurate GEOINT

reaching both the first and last tactical miles, one need only consider that the cost of taking no action would be paid for with the lives of America's sons and daughters.

NGA is committed to the JGA process and to solutions like those described by the Vice Chairman of the Joint Chiefs of Staff, Adm. Edmund P. Giambastiani Jr., who, while serving as Commander of JFCOM, noted last year that, "The warfighter requires the most up-to-date and highest resolution GEOINT data to form a highly accurate common operational picture and to guarantee that command and control, intelligence, surveillance and reconnaissance, and mission-preparation systems are interoperable."

Chance to Make a Difference

Through a sense of urgency to develop better, faster, more capable means to support our warfighters and decision-makers, NGA and JFCOM have agreed upon an aggressive schedule for the JGA, aimed at implementing joint solutions within the program for out-years to 2013.

The schedule includes establishing an "as-is baseline" and a "to-be vision." The assessment will also produce a gap and shortfall matrix, an evaluation of potential GEOINT processing and distribution solutions, and an implementation management plan. The NGA and JFCOM goal for completion of this assessment is summer 2006, with a follow-on goal for the JGA being the ability to influence the fiscal years 2008-2013 Program Objectives Memorandum process.

I am excited by the progress NGA and JFCOM are making as the co-leads for the JGA, and I am motivated by the men and women of our armed forces who willingly go into harm's way in support of our national security.

I now better understand the power of GEOINT and the critical need to meet customer demands, and I am humbled by the mission focus and dedication of our team here at NGA. With our service members, NGA team and mission partners at JFCOM as a backdrop, I see the JGA as an opportunity to truly make a difference in the global war on terrorism now and over the course of the "long war."

A Marine provides security during a patrol in Al Ish, Iraq.

JFCOM, NGA Establish Joint GEOINT Activity

By Jennifer Colaizzi

NORFOLK, Va.—U.S. Joint Forces Command (JFCOM) and NGA have agreed to move forward on a Joint Geospatial-Intelligence Activity (JGA) to enhance geospatial intelligence (GEOINT) among national and tactical users.

With today's present limited capability to share GEOINT collected on the battlefield with all users, JFCOM and NGA recently signed a formal memorandum of understanding (MOU), which defines activities that will result in more effective GEOINT information sharing across the services and user domains.

Providing Access

JFCOM and NGA's partnership will "provide information to forces that today do not necessarily have access to information that they could clearly benefit from, whether it's ground soldiers in Iraq, Navy forces on ship, or pilots in a cockpit," says John

Greene, NGA's lead on the JGA project.

More specifically, the partners will develop concepts, identify and support requirements, and develop standards, policy and procedures to expand access to information. "The goal is to provide information to people beyond the Beltway and command level," Greene

says.

For example, the Army needs information for its Future Combat System, the Air Force needs flight chart information for pilots, and the Navy needs information for the electronic bridge. "But the information compiled for Army boots on the ground may be useful for pilots," Greene says. "If a special operations unit has located an element and has a way to transmit information back, pilots would want this information as a real-time update, so they don't drop ordnance on the wrong target." Establishment of common standards and procedures will ensure that this information is discoverable, obtainable and usable across joint forces.

"Over the course of time, the national, operational and tactical lines have blurred to the extent that what's good for the President may be good for the platoon leader. Some of the same information that's briefed to the President is collected by the guy in the field," Greene says.

According to Greene, a major benefit to be reaped from the partnership is the establishment of new joint procedures for provisioning the geospatial context of the common operational picture (COP).

"It's making sure the ground, air and naval elements get the information they need so that the COP is based on the same geospatial framework," Greene says.

Seeking Common Solutions

As part of the JFCOM/NGA official MOU, signed on Dec. 19, 2005, the two organizations agreed to bring services, commands and agencies together in seeking common solutions to GEOINT issues that provide a joint capability. Common solutions will be sought in—



- bringing GEOINT to “the last tactical mile”
- developing architectures and concepts of operations that connect the National System for Geospatial-Intelligence (NSG) with currently unavailable or incompatible service systems and processes
- supporting a standards-based environment that leverages the emerging net-centric warfighter enterprise
- defining joint doctrine and procedures for the management and application of GEOINT at the strategic, operational and tactical levels of war.

“We need to provide warfighters accurate and timely imagery, geospatial information and fused GEOINT products—all of which are necessary for their mission,” says Navy Cmdr. Joe Ellenbecker, JFCOM lead on the JGA project.

Many Pieces to Partnership

To accomplish this, JFCOM will function as the joint force integrator and NGA as the GEOINT functional manager.

According to Ellenbecker, there are many pieces to the JGA partnership within JFCOM and its subordinate commands. “Cross directorate participation in JGA has been critical to its early successes, including the development of a concept of operations and documents of the ‘as is’ and ‘to be’ architecture,” he says.

To work more effectively and efficiently, several NGA representatives, including Greene, are located in JFCOM workspaces along with the command’s workforce of military, government civilians and contractors.

Working in JFCOM spaces provides command-level visibility. “It is beneficial to attend JFCOM briefings for situational awareness and to respond to anything

that might relate to NGA,” says Greene. “And I have the ability to reach back to NGA for support.”

Other steps include engaging the combatant commands and services with a requirements survey to formally document areas that need to be addressed and discussed. These areas include future training, optimal architecture and data standards to ensure interoperability on different customer sets. In addition, a cross-functional team of JFCOM JGA representatives is participating in Trident Warrior ‘06. The Navy’s premier experiment at sea, Trident Warrior aims to accelerate the delivery of network-centric warfare capabilities.

“We don’t want to build another box,” Greene says. “To the extent possible and feasible within fiscal constraints, we want to use existing capabilities and technologies. The services have invested a lot of money in their own architectures, and we’re not asking them to undo what they have done.”

Beyond JFCOM and NGA

The partnership on paper is between JFCOM and NGA, but in reality, the partnership is broader. “It includes the entire NSG community: all the services, combatant commands and agencies.” Each of them has a critical role in ensuring the horizontal integration of GEOINT and its availability at the lowest tactical level,” Greene says.

“We are at the forefront and trying to bring other interested parties into the equation to make this a success,” Ellenbecker says. “Ultimately, this project is about saving lives.”

Presently, the partnership is concentrating on U.S.-only data integration; international geospatial partnerships will be addressed in the future.

Working in Iraq: a Great NGA Experience

By Scott Kather

I had just completed my first deployment with NGA's Office of Global Support, from May to August 2005 at Camp Slayer, Iraq, when I volunteered to leave for a second deployment in October 2005. This deployment was also to Iraq but in support of the 101st Airborne Division (Air Assault) at Forward Operating Base (FOB) Speicher. I felt that since I had already completed one deployment that this would be easy since I was now the expert; I quickly found out I had a lot to learn.

I want to share my two different deployment experiences, hoping they will inspire others to join the deployment program.

From here to there

Just getting to your deployment location can be a challenge. Both times I left from Dulles International Airport on an overnight flight to London and then on to Doha, Qatar. The first time I was picked up at the Doha airport by NGA representatives, driven to the U.S. air base and put on a military cargo plane for the three-hour trip to Baghdad. Other NGA deployers picked me up there.

The second trip was identical until I left Doha. I flew to a U.S. air base near Ballad, Iraq, north of Baghdad. There were no NGA personnel at this base so I was on my own. It was in the middle of the night, and there were no flights going on to FOB Speicher until the next day. I had to make my way to temporary lodging, which was a 24-man tent, and find a place to sleep. The NGA cell phone I had did not work, and there were no DSN (Defense Switched Network) phones to call from.

The next morning I went back to the airport only to find out there were no planned flights to FOB Speicher for the next two days. On the third day in Ballad I found a Blackhawk helicopter flight going to FOB Speicher. The helicopter pad was a mile from the check-in point so I had to carry my two military-issue bags with almost 200 pounds of gear to the helicopter. A very young-looking soldier greeted me and said he would be my pilot. I responded that he didn't look old enough to drive let alone fly. I finally made it to FOB Speicher.

The size of FOB Speicher was overwhelming. Camp Slayer was small enough that I

The author was stationed at FOB Speicher, where he supported the 101st Airborne Division and shared a tent with 12 soldiers.



Photo by Scott Kather



The author poses next to a painting of a cross-eyed Saddam Hussein.

“I was always left with the feeling that the military was very happy we were there helping them out”—Scott Kather, commenting on his two deployments to Iraq as a geospatial analyst.

could walk from lodging to work or any other place in 10 minutes. FOB Speicher was 10 times larger. I needed a vehicle to just get from work to the mess hall

or the laundry facility. Lack of new housing on FOB Speicher meant another stay in a tent. I shared sleeping quarters with 12 soldiers—all 20 years younger than I. We spent many off-duty hours discussing

the best new games for the X Box or who would beat whom in the comicbook world. I moved into a permanent structure three miles from work after three weeks.

My Work

At Camp Slayer I worked in a large building with three other NGA analysts on large projects with long-term significance. We’d be asked to produce graphics on infrastructure and political or social issues. I worked with other civilians and rarely with the military.

On FOB Speicher I worked in the Analytical Control Element, or the “ACE.” This is a small, hardened building where I shared work space with the 101st Imagery Cell. Here I was working with the shooters or the guys who go out and kick in the doors looking for the bad guys. I quickly learned

that the average ground pounder with the 101st had no idea what NGA was or what we could do for them.

I spent the next three weeks introducing myself within the 101st area of operations and passing out NGA data. I had no time for long-term analysis; this was cranking out quick and dirty products. I used commercial imagery as often as I could. This allowed the troops to take a product with them and not worry about who could see it. Image maps, terrain analysis and shape-file generation for FalconView were the most asked-for products.

I worked a 13- to 15-hour day, seven days a week. I tried to take the attitude of “whatever it takes to accomplish the mission.” I received great support from other NGA analysts in Iraq and through NGA’s “reach back” support office. In the ACE I was given the opportunity to brief the Commanding General of the 101st, the Secretary of the Army and the Army Chief of Staff on NGA’s support to the warfighter. I was always left with the feeling that the military was very happy we were there helping them out.

Life in Iraq

Life at FOB Speicher was rougher than at Camp Slayer. My living quarters at FOB Speicher had indoor plumbing with hot water and electricity, but I did not have a heater for the room, so on many cold winter mornings it was hard to leave my sleeping bag. I had to sleep on an Army-issue cot, while at Camp Slayer I had a single-sized bed. Both locations had good laundry facilities with a three-day turn around.

As in most locations in Iraq with a large American presence, we had access to a good work-out facility, library, theater and food court. The food court at FOB Speicher offered pizza, subs, burgers and tacos, in case you were tired of mess-hall food. I was able to use the Internet to e-mail home and had access to a phone for the

occasional phone call. I wrote a lot of letters, which took up to 10 days to be delivered at home. I never felt disconnected from family, friends and work. I didn't have



Commercial imagery, like this image of Eastern Baghdad, helps NGA analysts produce geospatial products for its military customers. Kather produced over 450 custom products during his deployment.

much time to use any of the facilities on the FOB but I did get up at 2 a.m. to watch the Super Bowl.

Making a Vital Difference

While at FOB Speicher I produced over 450 custom geospatial products and handed out over 650 geospatial products. Even though most of the 101st didn't know what NGA was when I arrived they knew what we could do when I left. The hours were long, living conditions were not great, I missed home and family, working conditions were rustic, and it can be scary at times. But it is the best experience I've had in 15 years with the Agency.

The feeling of satisfaction you get when you make a product for customers who are standing directly in front of you and then receiving immediate feedback on how that product helped them is priceless. More than once I was told that the product NGA provides has helped save numerous soldiers' lives.

The professionalism and care to detail displayed by the soldiers of the 101st Imagery Team whom I helped support was fantastic. These young men and women are performing an outstanding job in service to our country. I highly recommend anyone within NGA who is considering becoming a deployer to take the next step. The personal benefits you gain far outweigh any risk.

Shape Files and FalconView™

Shape files provide a format for displaying geospatial data that allows it to be viewed and edited on geographic information systems in applications like FalconView™.

The Georgia Tech Research Institute developed FalconView™ for the Department of Defense as a portable computer mapping system for pilots to use in flight planning. FalconView™ displays aeronautical charts, satellite images and NGA products like Joint Operations Graphics. FalconView™ also displays map overlays for use in mission planning.

Office Helps People Away from the Flagpole

By Barbara Duckworth

Know the Earth... Show the Way." It's one thing to analyze imagery, data and issues from a distance, but one-fifth of NGA's workforce has a close-up and personal view at more than 130 customer sites.

Most of these personnel are externally assigned, relocating to work for several years at a customer site, while others are deployed on 4- to 6-month rotations with the unified combatant commands. Working directly with NGA's customers is professionally and personally rewarding, but connectivity and communication to NGA can be a problem, especially in Baghdad and other remote locations that have limited resources.

That's where the Office of Global Support (OGS) comes in. It's the job of OGS personnel in Reston, Va., and St. Louis to understand what requirements deployed and externally assigned personnel have, meet them, and champion their contributions to NGA's mission. We want to make sure that NGA personnel away from the flagpole can concentrate on their customers.

For example: While working at customer sites is rewarding, it's also important for NGA personnel to get paid. OGS manages payroll input for personnel who can't access the payroll system at their location. Also, customer locations don't always have access to the system NGA uses to track business travel, and the OGS Travel Team takes care of that, too.

When NGA personnel with families relocate, their issues can become even more complex. Recently, the Department of Defense changed its tuition reimbursement policy. For NGA personnel in

Ottawa this meant that they would have to choose between paying a substantial amount of money for private school for their children, sending them to a school that wasn't comparable to schools in the United States, or cutting their assignment short and returning early. OGS served as an advocate for these personnel, coordinating NGA resources to ensure that tuition would be reimbursed through the end of their tour.

Obviously, NGA is very concerned about the safety and security of its personnel and takes every precaution to ensure that they are in an environment that is as safe as possible. Working in developing or unstable countries is not without risk, however. OGS established the NGA Volunteer Deployment Team in 2003 to ensure the agency has a cadre of people trained and prepared to deploy.

Now that a large proportion of deployers have been on more than one rotation, they have been able to share valuable experience, giving OGS insight into improvements that will better prepare deployers in the future. Based on their feedback, OGS recently added classes to give deployers a better understanding of force-protection issues and raise the comfort level of those who will work far outside the regular office environment. Deployment training also includes an intensive first-aid course now, as well as a seminar specifically tailored to experienced deployers. This seminar updates deployers on policy changes, procedural issues and new training requirements that affect them.

Another deployer recommendation was to provide professional logistics support rather than rely on deployers to coordinate



Before deployment, NGA personnel get everything from first-aid training, above, to a seminar for experienced deployers.

logistics requirements in the U.S. Central Command's area of responsibility. Now OGS has a contract in place to ensure that all logistics are managed at forward sites, freeing deployers for their analytical mission.

NGA is vital to our customers' missions, and NGA personnel on site play a crucial role.

NGA's personnel play a vital role ensuring the mission of our Agency and our customers. OGS supports that mission by managing what can't be done easily at a customer site, serving as an advocate and interfacing within the Agency. OGS is continually working to improve its support to NGA's frontline—NGA personnel at customer sites.

NGA Support Team Leaders a Diverse Group

By Julia Collins

The NGA Support Team (NST) Leadership Conference in St. Louis March 15-17 brought together a diverse group. NSTs serve in the continental United States at combatant commands, intelligence agencies and military service locations. They also serve a variety of customers outside the continental United States.

Bringing the NST leadership together allows them "to share ideas, successes and lessons learned," said Barbara Duckworth, Director of the Office of Global Support (OGS) and conference coordinator. "It also allows us to push strategic information to the NSTs."

"Sharing knowledge is how we're going to get to better intelligence earlier in the analytic process," said Mary Irvin, Director of the NST at the National Security Agency.

In her "Partnership versus Support" presentation, Irvin described how the NST at NSA has built a mutual partnership with the Agency instead of serving in a traditional support role.

"NSA sees the value of the team, and the return on investment has been huge," she said. A new process to reintegrate NST members returning to the main NGA locations from their field assignments was one of the main meeting topics. Under the new reintegration process, returning members will work with assignment officers to find appropriate positions for them within NGA. Assignment officers will serve as the go-between for employees and will also help selecting officials through the placement process. Those who do not find positions through Assignment Opportunity Notices will be referred to a corporate reintegration council to find the right match.

Other topics included NGA corporate connectivity to external sites, which continues to improve, and the capability of NSTs to reach back to NGA directorates for assistance, another area that continues to improve.

Marketing NGA capabilities to the field was a key issue stressed by Air Force Brig. Gen. Michael F. Planert, NGA's Military Executive.

Overall, the March NST meeting brought several key issues and updates to the table. One attendee noted that the meeting was a great expansion on previous meetings and a lot had been accomplished since the last session.

Sensing Baghdad

By Air Force 1st Lt. Justin Botts

Serving in Baghdad as an Air Force Reservist, I was surprised to discover how different the place is from what I expected. After taking it all in, I have tried to write down as much of it as I can remember. Here go my perceptions in five different ways:

Sound: quiet—almost-asleep quiet. Machinery runs in the distance. Helicopters and airplanes occasionally break the stillness with ferocity and vengeance. The city still seems hung over from the 30-year bender it took over the last three decades. Occasionally gunfire sounds like ladyfingers in the distance. It seems remote and distant from where I stand.

Sight: devastated. From 20,000 feet all the way down to 6 feet above the earth, the views are of utter devastation. “Black Hawk Down,” “Full Metal Jacket,” “Maximum Overdrive” devastation. Kathy

Bates and Steven King devastation. There are places where things have been rebuilt to be destroyed and rebuilt to be destroyed and rebuilt again to be destroyed in continuing cycles. Patchwork is everywhere. What is permanent has pockmarks and bullet holes and what is temporary

will obviously be gone soon. Houses look like war pictures from history books. It can’t be real and yet it is. The wind is blowing today with some strength, 40 and 50 knots at times. A tent, almost as big as a three-bedroom house, blows over, and

men scramble to gather what has been scattered. It is strange to see all of this and think about life back home.

Taste: pizza, potato chips and Gatorade. Baghdad tastes like whatever I bring into it.

Touch: hard and dense like the tire on a tractor trailer. The place seems as worn as the face of an old man or a well-used piece of sandpaper. Dust is everywhere, and the desert sand seems to enter every crack and fold where it can find its way. I sleep for an hour on a couch that is comfortable the way a tree is comfortable after you’ve hiked for several miles and want a place to rest your back and legs.

Smell: a distant, permeating smell that reminds me of a fire in a home near mine when I was a kid. It was a long time ago, but the image and smell of the burning house spring immediately to mind. Rubber and wood and petroleum all smolder together to form a strange perfume. Occasionally someone walks by wearing cologne or an aftershave, and the opposites seem to tear against each other. After we depart, the smell stays with the airplane for only a few minutes.

In my mind, all of these senses blend together. I snap photographs that I think look interesting. None captures the essence of this place. None seems to do it justice, despite how I see them through the lens before I take the shot. Perhaps the sensations I’ve captured here are not real. Perhaps they’re dead on. Whatever the case, they are mine to remember and share.

The article is based on an e-mail Lt. Botts wrote to his father-in-law, John Greene, Chief of the NGA Support Team to U.S. Joint Forces Command (JFCOM).



A regular user of Flight Information Publications, Operational Navigation Charts and other NGA products, Air Force Reserve 1st Lt. Justin Botts is a C-130 pilot on active duty with U.S. Central Command Air Forces (CENTAF).

Holistic Targeting Depends on GEOINT

By Calvin Hickey

NGA and geospatial intelligence (GEOINT) are an integral part of the targeting process, and the Agency's heritage as a contributor to success in the battle space reaches back for decades. While NGA's traditional role in the planning and execution of military operations is well-known, modern realities call for a more holistic understanding of targeting's GEOINT dependencies.

Simple facts support broadening our perspective on the matter:

- While NGA products and services for weapons guided by the Global Positioning System (GPS) meet or exceed the most stringent requirements for accuracy, other forms of weapon guidance require a more holistic understanding of GEOINT.
- NGA's navigational products and other geospatial information will assume increasing importance in mission planning and execution as weapon systems and concepts of employment with more complex requirements evolve.
- Our GEOINT analysis, while adequate to answer questions warfighters have traditionally posed, has substantial potential to grow in wholly new dimensions.

- Fundamental changes in the nature of warfare since the end of the Cold War demand that we transform the support we provide to our warfighters.

Target Characterization and GEOINT

Improving GEOINT support to warfighters revolves around the issue of expanding the coverage and detail of information we lump under the umbrella term "target characterization." Simply stated, target characterization deals with describing the functional and physical attributes of potential targets, whether they are fixed facilities or mobile/relocatable assets. But that simple explanation hardly captures all dimensions of target characterization, and it fails to convey the profound dependencies of the process upon GEOINT.

Everything that exists, and every event that occurs, is referenced to a four-dimensional construct we call space and time. Warfare, waged in this construct,

A Tactical Tomahawk, the next generation of Tomahawk Cruise Missile, explodes on target while executing a land attack mission during a contractor test and evaluation.

depends on GEOINT to provide context for events occurring in that environment and to physically and functionally describe potential targets.

The legal definition of GEOINT is found in U.S. Code, Title 10, Section 467, which authorizes NGA and defines its mission. GEOINT is defined as “the exploitation and analysis of imagery and geospatial information to describe, assess and visually depict physical features and geographically referenced activities on Earth.” Through this definition, NGA is charged to fully explore the potential contribution GEOINT can make to the planning and execution of military operations.

Divining Targets That Matter

Targeting is all about figuring out the best ways to change an enemy’s behavior. Which target you attack matters more than how accurately you attack it.

The hardest work in targeting involves sifting and sorting from all the physical and virtual assets of an enemy those things that enable the behaviors we want to change, the “critical nodes,” and then determining what effects we want to exert on those nodes to cause our enemy to comply with our will. Of course, if we were to accomplish this portion of the targeting process to the ideal outcome, we would achieve the truth expressed by Sun Tzu (c. 500 B.C.): “Supreme excellence consists of breaking the enemy’s resistance without fighting.” Practitioners of the operational art learn early on, however, that ambiguity is a fact of life. Whether as a natural consequence of circumstances or the result of the enemy’s deliberate efforts to confuse us, imperfect awareness is a constant feature of the winnowing process in targeting.

GEOINT holds great promise for reducing the ambiguity that plagues the task of divining those targets that really matter from all possible targets. During this

winnowing, an expanded application of GEOINT products and tradecraft can make the most significant improvement to target system analysis (TSA), the critical ingredient for effective combat planning and execution. Geographic information systems, with smart (explicitly related or topologically structured) data and relational databases, are a powerful tool for TSA. These systems can provide a uniquely effective means to formulate recommended courses of action (COAs) for the application of lethal and non-lethal capabilities, as well as a means to assess consequences of execution (COEs), a matter of highest concern in the current effort to minimize risks of collateral damage.

Figuring Out How to Attack

Attacks on targets can have unintended consequences. In the vast majority of cases, when these have occurred, our ability to accurately place weapons on targets has exceeded our understanding of the functional and physical properties of the target. The result has been that we have used the right weapon against the wrong target, used the wrong weapon against the right target, or gotten both the weapon and the target wrong.

Once potential targets have made it through the TSA process to the point where they are considered candidates for action, the emphasis of target characterization shifts to the targets’ functional attributes. These include the targets’ internal processes, operating patterns and dependencies on other targets. Specific information about the targets’ physical attributes is also required: how their internal components are arranged, how they are constructed, their current operational status, what is located nearby, etc. All current and future elements of what we conceive as GEOINT tradecraft, products and services support this process, albeit at a greatly expanded breadth and level of detail than our current practice.



*GBU-39-A load crew
Airman here uses a
jammer to attach a pair
of GBU-39 bombs to an
F-15E Strike Eagle.*

The lag in target characterization to support weapon application was readily apparent as far back as World War II. In the latter years of the Vietnam War, the advent of precision-guided munitions (PGMs) further accentuated the gap between our ability to accurately place effects and our understanding of the targets we were placing the effects upon and the consequences of these effects. Although the warheads used in PGMs during Operation Iraqi Freedom (OIF) were basically unchanged from those used in Vietnam War-era PGMs, their delivery accuracies were improved by substantial margins, in many cases by orders of magnitude. Distressingly, on-the-ground munitions-effectiveness assessments from OIF showed that the gap continues to widen between our ability to accurately apply effects and our ability to understand what we are applying the effects against.

Within a year, the first of the miniaturized munitions (all of them PGMs)—the GBU-39 Small-Diameter Bomb—will achieve an initial operating capability. It will soon be followed by other miniaturized-munition PGMs, such as the Army's GPS-guided 155 mm Excalibur artillery round (a rocket-assisted projectile that can reach more than 60 kilometers) and GPS-guided Multiple Launch Rocket System (G-MLRS). All of

these miniaturized munitions have two features in common: they have incredibly exacting delivery accuracies and their warheads carry substantially less high explosive. Thus, they have correspondingly less range of effect, and, thus, have incredibly discrete interactions with targets. Extrapolating from our previous track record involving current inventory weapons, it is easy to see that the advent of miniaturized munitions will substantially up the stakes of "getting it right" when it comes to target characterization for properly applying weapon effects.

DEWS an Argument for Holistic GEOINT

Before the end of this decade, we will see the advent of directed energy weapons (DEWs). First, it is critical to understand that DEWs do not rely on GEOINT as a means to ensure their delivery accuracies. In many cases, target location error is not even an issue for their successful employment. Also, DEWs do not use high explosive effects to affect targets. Instead, they use various forms of electromagnetic force to affect targets at the level of their molecular and atomic structures. While not depending on GEOINT for delivery accuracies, these weapons will require a level of detail for target characterization that exceeds anything in our past experience. Details like the arrangement of the electrical system and grounding paths in a target; the composition of the external coating of the target for thermal transmissivity; and the presence, gauge and polar orientation of reinforcing bars in concrete targets can become make-it or break-it elements of information for the effective application of DEW.

When it comes to target characterization to select the right weapon and use it in the right way, the targeting community is on an increasingly escalating path of dependence on GEOINT. At various points in the process, GEOINT will be either the

What are DEWs?

Directed energy weapons (DEWs) disrupt, degrade, damage or destroy targets through concentrated bursts of energy. Currently DEWs use electromagnetic energy as the mechanism of effect against targets, principally in the form of either high-power radio frequency (HPRF) and microwave (HPM) emissions, or high-energy lasers (HEL).

Because modern electronic devices typically operate on extremely low voltages and draw little current, HPRF weapons affect them by inducing swift transient voltage “spikes” that can cause them to reset and/or lose volatile memory, and also permanently damage the microprocessor and memory chips. HPM weapons “excite” the atoms in the target by “pumping” their energy level, which causes changes in the material properties of the target that persist as long as the weapon continues to fire its effect. Against personnel targets, HPM effects are non-lethal but cause exceedingly painful burning sensations that result from stimulation of nerve endings in the skin, whereas against materiel targets HPM effects can range from spontaneous phosphorescence of concealed materials to actual molecular breakdown of components of the target.

HELs fire in the near-to-mid-infrared and near-ultraviolet wavelengths. They cause targets to undergo mechanical damage and, in some cases, structural failure. These effects occur when the surface coatings and materials of targets undergo massive thermal effects because they cannot

dissipate the enormous power of “coherent” electromagnetic energy that makes up the laser’s beam.



Artist renderings of Army's Mobile Tactical High-Energy Laser (MTHEL) weapon in operational use.

Future DEWs are being developed to employ such exotic damage mechanisms as acoustic vortices and harmonic resonance responses generated by extremely low-frequency sound waves. DEWs provide warfighters with several critical advantages: their effect can be

exactly tailored to the target, their effects can often achieve desired changes in the operation of the target with little or no enduring physical effect, the ability to control their output means the effects are “scalable” and persist only while the weapon is functioning, collateral damage risks can be minimal, and because they only require electric power to operate they have a potentially infinite supply of “bullets.”

critical source of information for target characterization or the unifying structure that makes other forms of intelligence usable by the targeteer. Often it will serve both purposes.

The implications of these rapidly advancing weapon technologies for GEOINT systems, architectures, business practices and tradecraft are inescapable. And they are the clearest and most demonstrable arguments for the need to develop a holistic understanding of true GEOINT dependencies in the targeting process.

Complexity of Combat Assessments

If we're expecting to be substantially more exacting in the selection and nomination of targets and also expecting to apply increasingly discrete effects against those targets, then the task of figuring out what we actually did to those targets has gotten complex almost beyond imagination.

Improving the application of GEOINT to battle-damage assessment, or more accurately stated, combat assessment (CA), involves business practices and tradecraft as well as technology. Instantiating knowledge of the targeting process in GEOINT training is most important. NGA CA teams can also enhance their expertise by participating in the joint collaborative environment where targeting is conducted. Active participation in this environment gives analysts an understanding of why a target was nominated, why a particular weapon was applied in a particular way, and what the expected result of an attack was.

Warfare Always Changes

Every war is a departure from the mold of the last.

Mobility on the battlefield and the value of a robust industrial base were hallmark developments of the Civil War. Battlefield mechanization, aviation and submarines fundamentally changed warfare in the

early 20th century. The principles of mutually supportive joint operations; innovations in the field of logistics; and the command and control of air, land and naval forces over broad expanses of the Earth were the innovations of World War II.

A decade before the end of the 20th century, the fall of the Soviet Union and the end of the Cold War heralded the close of an era of planning for large-scale force-on-force engagements. The "luxury" of employing large numbers of forces with different capabilities in expansive battle spaces, such as the Fulda Gap, was replaced by the need to wage abrupt, sporadic, often vicious warfare in close, frequently urban quarters.

In the global war on terror, the enemy has become a stateless entity, often unconstrained by rules governing what constitutes lawful targets and permissible types of weapons and methods of fighting that much of the world came to accept over hundreds of years. This enemy has also become more difficult to challenge because it has successfully intermingled and become virtually indistinguishable from innocent civilian populations. As a result, concerns for matters like collateral damage and the effects of operations planning on local culture have become paramount.

The net result of this sea change in warfare has driven weapon- and weapon-system development to new extremes in lethal, kinetic capabilities. It has also placed a premium on fielding non-lethal and/or non-kinetic capabilities, such as incapacitating warheads using sticky foams or anti-traction agents to render roadways impassable. In addition, whole new families of tactics, techniques and procedures for the application of the existing and emerging weapons and weapon systems have been developed. The targeting community, along with its doctrines and processes, is rapidly transforming to meet this new reality.

What Now?

NGA and the discipline of GEOINT are adapting to inevitable changes in warfare. One key is expanding the linkages between GEOINT tradecraft and the operational targeting community.

While NGA analysts need to understand the activities and information needs of targeteers, they also have much to offer them. Targeteers need both knowledge of geospatially based analytical techniques and the tools to tap into the power of GEOINT as a foundation for decision-making and planning.

Large-scale availability of GEOINT implies a robust production capability of fully attributed, richly detailed foundation data. Business practices that focus on providing this expanded thematic data, linked to geographic area threats and current guidance, will enable warfighters to perform full-spectrum planning.

Targeting has become more complex than ever. In rising to meet new challenges, NGA continues its historic role as an integral part of the process. Our warfighters, national interests, national security and, possibly, survival demand no less.

The Joint Targeting Cycle



The Joint Targeting Cycle is the means by which targets are nominated and appropriate forces are recommended to attack them. The targeting process concerns itself with the application of the full spectrum of military capabilities (lethal/non-lethal and kinetic/non-kinetic) against fixed, mobile and time-critical targets, using all the means of naval, air and land warfare. The gold stars indicate the four phases of the cycle where GEOINT dependencies of the process are most significant.

- **Target Development, Validation, Nomination and Prioritization** winnows down to the most lucrative targets to achieve the desired warfighting end states. GEOINT support is critical to answering which targets make sense.
- **Capabilities Analysis** determines the optimal combination of weapon(s) and employment tactic(s) to achieve the desired direct and cascading effects. GEOINT support is critical for accurate target characterization to assess the likelihood of the desired direct and second-order effects.
- **Mission Planning and Force Execution** translates the commander's decisions on which targets to attack and how they are to be attacked into actual operations. GEOINT support is critical in getting air, land and sea forces to the right target, at the right time, and enabling them to come home.
- **Combat Assessment** examines the results of executed operations to determine effectiveness of attacks, along with needed improvements in weapons and/or tactics, and to make recommendations regarding the course of further combat operations. GEOINT support is critical for information that will shape the ongoing conflict, as well as future capabilities.

BRITE Provides Real-Time Imagery to the Field

By Paul Moskal

Of all the software packages I have on my Space Operations System (SOS) box, BRITE appears to have the most functionality,” wrote the Space Operations Officer with the Army’s I Corps. “My Intel guys love me because I can passively get all this information.”

BRITE, which stands for Broadcast Request Imagery Technology Environment, supports the ability of users in the field to request and access near-real-time imagery and imagery-derived products for situational awareness. They can also use BRITE to query against NGA’s holdings.

U.S. Special Forces used BRITE to find the hospital in Iraq where Army Pfc. Jessica Lynch was taken following her capture in 2003 and to monitor her rescue in real time. The Army Space and Missile Defense Command sponsored the development of BRITE.

The system delivers two elements of the NGA enterprise architecture: The BRITE server delivers imagery and imagery-derived products, and the BRITE client provides access to imagery and information held in NGA Libraries, National Information Libraries and Command Information Libraries.

With its flexible architecture, BRITE provides tactical users, who may have limited communications and support infrastructure, with the following capabilities:

- Ease of use, with very simple, basic computer skills; installs on user-provided infrastructure.
- Near-real-time notification that National Technical Means imagery has been collected, with access to as much

as two years’ coverage of airborne and commercial imagery sources.

- User-selected coverage, with specified tailored products and quick delivery via collateral reach-back communications.
- Non-traditional communications paths.
- Messages that can be encoded in standard U.S. Message Text Format (USMTF) for delivery over broadcast systems, such as the Global Broadcast System (GBS).
- Delivery of imagery in user-manageable sizes that do not require imagery-analysis workstations for display or wideband communications for transmission.
- A simple graphic point-and-click interface for all user manipulations.
- Accessibility 24 hours a day, seven days a week.
- Imagery geo-referencing and overlays to maps for orientation.

BRITE supports military and federal analysts, and tactical users at the last tactical mile. It provides current imagery and data to users who lack access to the communications systems of NGA Support Teams, with full bandwidth. Access is via defense networks and non-networked communications such as broadcasts (for example, UHF, S-Band, Ku-Band and Ka-Band). To interface with a variety of user systems and capabilities and allow for incremental upgrades, BRITE architecture is flexible. BRITE also includes mechanisms to ensure that access to restricted and sensitive data is controlled and granted authorized users only.



U.S. Air Force photo by Staff Sgt. Felicia Haecker

Army Pfc. Jessica Lynch is placed into an ambulance after arriving at Ramstein Air Base, Germany early April 3, 2003. BRITE helped Special Forces locate the hospital where Lynch was taken after her capture.

The BRITE system sends collection notifications, or Data Availability Notices (DANs), to BRITE users. These can be sent via broadcast or directed means through a network. The DANs provide near-real-time notification of imagery collected by national assets. These notifications are sent before the imagery has been delivered to any NGA library and are based on actual collection information.

A second set of DANs is sent when images are available in the libraries, indicating that image chip requests are now possible. These notifications may be based on library-specific collection data. A user can request image chips based on information in the DANs using a Tactical Imagery Request Message (TIRM).

User-Friendly Interface

BRITE View is an application program that can be executed from a user platform configured to meet community standards. Specifically, the BRITE View client runs on the Microsoft Windows® 2000 and Windows® XP operating systems.* It works on these platforms for systems configured for military and intelligence networks or for stand-alone radio operation.

The BRITE View online-help capability provides users with accessible reference information. It provides tutorials on how to perform specific BRITE View tasks. It is organized by tasks, chapters and topics, and can be used to search for specific topics and words.

The BRITE system can support multiple imagery libraries. By supporting multiple libraries, the system can provide more complete coverage and more reliable access to imagery. In the case where users see that an image has been taken but not delivered to a library connected to BRITE, they can request the imagery via other means.

"One of the things I've done is to facilitate integration of BRITE and GBS to Air Force Special Operations Command forward-deployed units," wrote a captain assigned to Prince Sultan Air Base in Saudi Arabia.

"I've also installed BRITE here in command operations to support operations in progress and have had very positive results. Our forward-deployed forces have expressed to me how valuable a tool BRITE can be to prepare our air crews and now that I'm here and using it, I agree completely."

"Too neat—received the THUMBNAIL in 3~5-min. TOOOOOOO COOOL. I did this sort of thing in half the [usual] time. While we were deployed the air crews got a close-up of the image taken THAT day," said an Air Force master sergeant assigned to the 16th Operational Support Squadron.

With the encouraging feedback, system managers are eager to expand the user base for BRITE.

**Microsoft and Windows are registered trademarks of Microsoft Corp. in the United States and other countries.*

Exercise Demonstrates Interoperability with Coalition Partners

By Army Lt. Col. Greg Creech

Operators of British and Australian intelligence, surveillance and reconnaissance (ISR) assets had challenges integrating imagery effectively into the theater ISR enterprise, in some instances, during Operations Enduring Freedom and Iraqi Freedom. The impact limited the value of these assets to the command structure and warfighters.

With the support of the Office of the Under Secretary of Defense for Intelligence and the Joint Staff, NGA stepped forward to address this interoperability issue by creating an annual series of flying exercises known as Empire Challenge. Australia, Canada, the United Kingdom and the United States participate in the exercise, which focuses on interoperability by identifying options, evaluating changes to procedures and infrastructure, and implementing solutions.

Although NGA is the sponsor of Empire Challenge, the exercises go well beyond the Agency's focus on imagery and geospatial products.

Both the Joint Staff and U.S. Joint Forces Command view Empire Challenge as a significant opportunity to advance their interoperability goals and objectives for network-centric operations and multi-intelligence collection management, fusion and targeting.

Sharing System Capabilities

To achieve sustainable interoperability, Empire Challenge provides coalition ground stations with the technical and system-level interoperability tools to task, collect, process and disseminate data from U.S. airborne sensors. At the same time, the exercise gives U.S. ground stations the same capability with regard to coalition airborne sensors.

By sharing system capabilities, joint commanders have near real-time access to all allied airborne ISR sensors for a more comprehensive view of the battle space and an expanded capability to view specific areas of interest. Greater situational awareness and quicker decisions should result.

An F/A-18F Super Hornet assigned to Air Test and Evaluation Squadron Nine (VX-9) returns to its home at Naval Air Weapons Station (NAWS) China Lake.



Empire Challenge works on the implementation of data standards and the verification of procedures and systems compatibility as the foundation for building an enduring interoperable enterprise and for sharing ISR data and products.

The live-fly portion of Empire Challenge is conducted at the Naval Air Warfare Center in China Lake, Calif. The Center's test ranges are ideally suited for this type of event, with a wide array of targets optimized for ISR operations, opportunities for ordnance delivery and battle damage assessment, the availability of operational and prototype airborne collection systems, a ground infrastructure with connections to operational networks and research and development networks, and excellent weather. The ground segment of the exercise uses facilities at China Lake and within the participating countries.

Empire Challenge 2005

In an exercise last October, Australia, the United Kingdom and the United States took part in full airborne and ground operations. An observer last October, Canada anticipates a full partnership role during Empire Challenge 2006. Live-fly assets last October included the United Kingdom's Nimrod MR-2 with full-motion video capability, a U-2 reconnaissance plane with a SYERS-2A electro-optical sensor, an F/A-18 fighter-attack aircraft with SHARP electro-optical pod, and a King Air twin-engine turbo prop aircraft with a Lynx Synthetic Aperture Radar (SAR) Predator sensor.

Multiple American and British sorties produced 135 images for coalition use. The imagery test bed of the Defense Department's Distributed Common Ground System at China Lake received, processed and disseminated the airborne imagery. Australian and British imagery analysts collocated at China Lake used subsets of their national systems to capture

and exploit the imagery. They were able to send the imagery to analysts in the United Kingdom and Australia for exploitation and then return the results to China Lake. The imagery was also posted in a newly created partition of the NGA Community Airborne Library to allow coalition access. This allowed the Empire Challenge participants to provide a full interoperability workout of coalition ground processing, exploitation, dissemination, security and standards implementation.

NGA Innovates

Empire Challenge 2005 saw the roll-out of NGA's innovative Imagery Exploitation Support System (IESS) and an Imagery Product Library (IPL) with a coalition partition. The IESS/IPL co-host provided several important capabilities:

- facilitating work-flow management by ensuring priority handling of time-sensitive airborne imagery
- providing the means for U.S. imagery analysts to screen and release imagery for domestic release
- providing a product library for storage and access of shared coalition imagery.

Another innovation was a demonstration by the Air Force Research Lab, which used its Moving Target Information Exploitation (MTIX) workstation to ingest and merge full-motion video from the Nimrod MR-2 and Ground Moving Target Indicator (GMTI) radar from the King Air Lynx SAR Predator sensor. With the addition of cueing from ground sensors and Nimrod MR-2 full motion video, Empire Challenge demonstrated the successful operation of the coalition interoperable architecture against a scenario involving several "terrorists" placing simulated Improvised Explosive Devices (IEDs) on the China Lake ranges.



U.S. Air Force photo by Tech. Sgt. Anna Hayman.

A Royal Air Force MR-2 Nimrod reconnaissance aircraft sits on the tarmac prior to a sortie from Incirlik Air Base, Turkey.

Michelson Labs and the Advanced Weapons Lab at China Lake provided exceptional support for evaluating interoperability standards; systems-level technical testing of operational equipment, sensors and ground stations; and data collection for the validation of targeting systems. New JPEG2000 imagery compression tools enabled significant enhancements in the end-to-end transfer and exploitation of U.S. imagery at multiple Empire Challenge sites in the United States, the United Kingdom and Australia. This new compression capability resulted in an order-of-magnitude decrease in the time required to send imagery across the oceans to bandwidth-constrained users on tactical networks. Imagery compression using Kodak's Advanced Geospatial Imagery Library Enterprise demonstrated the ability to successfully send large imagery files to Australia using only phone lines and desktop encryption devices.

Opportunities Ahead

Empire Challenge 2005 served as an excellent event to identify opportunities

for improving interoperability. Detailed analysis of metadata associated with coalition imagery revealed areas where imagery-processing algorithms did not include all the data required to facilitate rapid derivation of precise coordinates using tools such as the Precision Targeting Workstation. The exercise provided NGA and the coalition members a list of priority sensors to build target models for use with these tools. It also provided the opportunity to collect imagery for use in validating the accuracy of precision targeting tools.

Planning is under way for Empire Challenge 2006 in September, with assets from Australia, Canada, the United Kingdom and the U.S. Air Force and Navy. The primary focus will be the same: coalition interoperability, but Empire Challenge 2006 will add more complexity with a greater variety of collection systems and an expansion beyond collecting imagery to giving exercise participants the opportunity to fuse multiple types of intelligence.

At Army School, NGA Prepares Soldiers for War

By Ralph Erwin and Marsha Mocaby

The integration of the NGA team into our exercises has been an overwhelming success,” says Army Lt. Col. Jonathan Williams, an instructor in Army tactics at the Command and General Staff College, Fort Leavenworth, Kan.

For five years, analysts from the Analysis and Production Directorate’s Eurasia/Africa Office and NGA Support Team-Army have engaged students directly during the execution phase of their annual division-level joint exercise.

The College teaches about the warfighting environment for joint, interagency and multinational operations as part of its intermediate-level education for mid-career officers. During the advanced applications program, which follows their intermediate-level instruction, the students focus on immediate duty requirements.

Collaboration

NGA and Army collaboration at the College has been unique and challenging for both the professional analyst and military student. The students gain an information edge for their mission analysis and the decision-making processes. In turn, the NGA analysts are able to directly see how geospatial intelligence (GEOINT) is used to prosecute military objectives based on warfighters’ battle-space visualization requirements.

The students submit requests for information that guide the analyses of the NGA professionals. In response, the analysts generate standard and non-standard GEOINT products, such as helicopter landing zones and river-crossing graphics. By integrating specific datasets, expert

analysis and visualization tools like NGA’s FalconView™, both students and their instructors achieve a reliable understanding of their battle space.

“My students are impressed with the capability of the NGA analysts and how GEOINT products enhance their ability to visualize the battlefield,” says Army Lt. Col. Stephen Tennant, instructor and engineering subject matter expert.

“As we push our students to fully analyze the available data, so that they can make better command decisions in the heat of battle, NGA has a key role to play,” Williams says.

2006 Exercises

For the first time, NGA took part in the mission-planning phase for this year’s division-level joint exercise, completed in March. The analytical rigor NGA added to this phase boosted the students’ ability to evaluate key factors in moving a division, such as key infrastructure and lines of communication, including roads and railroads.

Efforts are now aimed at enhancing the College curriculum.

During a recent site visit, requirements managers from the Eurasia/Africa Office got a better understanding of College exercises and the importance of GEOINT support to future warfighters. Staff told the NGA visitors that 60 to 70 percent of the students deploy directly to U.S. Central Command’s area of operations after graduation. Regional analysts, working with geospatial and imagery analysts, are key to enhancing GEOINT support.

Getting GEOINT to the Services

By John Liebsch and Col. Andy Marotta, USAF

NGA is well-organized, poised and working coherently to provide the best geospatial intelligence (GEOINT) to our nation's military services. Their mission—to organize, train, equip and prepare this nation's military forces—covers weapon-system development, training, exercises, experiments and demonstrations, test and evaluation activities, doctrine development, modeling and simulation activities, and many more initiatives.

Two offices that report to NGA's Military Executive (MX), Air Force Brig. Gen. Michael F. Planert, and the Service Intelligence Center NGA Support Teams (NSTs), in the Directorate of Analysis and Production, provide the majority of the Agency's direct support to the services. The two enablers within MX are the Office of Military Support (OMS) and Office of Future Warfare Systems (OMW). Both work with the Service Intelligence Center NSTs under the Directorate's Military Executive, Army Col. Ralph Butler, in a coordinated effort to ensure that GEOINT is at the forefront of service mission areas.

Military Support

OMS provides day-to-day support to fielded activities, systems and forces through NSTs dedicated to each of the services.

These teams identify requirements and serve as advocates for the processes and priorities of their customers. For example, the Air Force NST has established a framework to migrate current product-focused aeronautical-information processes to a knowledge-centric digital environment. The effort will be accomplished through a Digital Aeronautical Working Group composed of members representing NGA, the services, joint commands, Federal Aviation Agency and partners from the United Kingdom. Meanwhile, the Navy NST completed final field testing of NGA's Digital Nautical Chart (DNC®) with a Navy operating system that will lay the foundation for transforming the Navy to a digital data-centric environment. Another NST within OMS—the U.S. Joint Forces Command (JFCOM) NST—has formed a strategic partnership with Joint Forces Command headquarters to transform how NGA and the Defense Department collect, produce, analyze and disseminate GEOINT. (See the article "JFCOM and NGA Working to Enhance GEOINT" in this issue.)

A key function across OMS is NGA's engagement in about 15 joint exercises annually. Personnel deploy for these exercises to provide expertise on site while reaching back to NGA for expanded support. The testing and solutions achieved during these exercises are linked to NGA's readiness program, providing a mechanism for tackling GEOINT shortfalls.

The service NSTs work with the many organizations within NGA that deal with the services. They ensure that the right experts are working an issue and share information about an issue and its

Marines peer over a cliff to spot any type of threat against Camp Fallujah, Iraq. NGA works diligently to ensure that GEOINT reaches all facets of the nation's military services.





The Global Hawk Unmanned Aerial Vehicle provides Air Force and joint battlefield commanders near-real-time, high-resolution, intelligence, surveillance and reconnaissance imagery.

status with the parties involved. Thanks to this crucial coordination/integration function the service NSTs provide, NGA is presented as a well-orchestrated, world-class organization.

Future Warfare Systems

Responsible for ensuring that GEOINT is infused into new and emerging system-development activities, OMW interacts with the services' program managers and program executive officers. An example of this interaction is the work OMW accomplishes with the Army's Future Combat System (FCS). OMW works closely with the program manager to identify its GEOINT requirements. OMW also engages with the Under Secretary of Defense for Acquisition, Technology and Logistics to ensure that appropriate GEOINT is incorporated as system development activities progress through milestone decisions toward their initial operating capability.

OMW supports NGA's Military Executive and other senior leaders who participate in activities of the Defense Acquisition Board. NGA's participation as the board's only member from the Intelligence Community emphasizes the magnitude of GEOINT's importance to future warfare systems and the necessity of making sure that GEOINT is considered at all levels in the system-acquisition process. Once a system achieves initial operating capability, OMW hands the responsibility for that system to OMS for placement into its portfolio of supported systems.

OMW is also NGA's main point of contact for the Missile Defense Agency and works with the Analysis and Production Directorate to lead the Agency's future targeting initiatives. Key programs being worked by OMW include:

- Future Combat System
- Expeditionary Fighting Vehicle
- Joint Hi-Speed Vessel
- Next Generation Destroyer (DDX)
- Unmanned Ground Vehicles
- Helicopter Upgrades
- Joint Strike Fighter (F-35)
- F-22 Fighter
- Joint Mission Planning System
- Distributed Common Ground System
- Future Targeting Initiatives
- Future Marine Pre-positioning Force
- Global Hawk Unmanned Aerial Vehicle
- Navy Unmanned Common Air System
- Small Diameter Bomb

Service Intelligence

Members of the Service Intelligence Center NSTs are assigned to each of the four Service Intelligence Centers: the Air and Space Intelligence Center, Marine Corps Intelligence Activity, National Ground Intelligence Center and Office of Naval Intelligence. The imagery intelligence and geospatial analysts working on these teams support the centralized analysis of all-source intelligence by providing timely, tailored and relevant imagery-derived intelligence information, products and services.

Strategic priorities for the NSTs include tradecraft development, enhancing the information-sharing environment and advancing GEOINT. Analysts from across

the Service Intelligence Center NSTs work closely with each other and colleagues from the Intelligence Community to ensure mission success.

A Coordinated Effort

Some missions span all three NGA organizations: education, sharing information and getting the right experts together. With military personnel rotating to new positions every three-to-four years, educating and informing military decision-makers of GEOINT activities is a continuous shared mission. Complicating this education mission is the dynamic nature of NGA's apparatus for sharing GEOINT, with its daily flow of new ideas, new initiatives, new decisions and program modifications. NGA's partners need to stay abreast of changes to the status of GEOINT activities if they are to support GEOINT programs/budgets and understand how GEOINT affects the various domains of the military.

organizations across the Agency to understand and participate in GEOINT activities and programs. In many instances, this mission entails getting the right experts together and passing information directly between key personnel working programs and initiatives. At other times, answering questions directly or pointing customers to where information resides are the best methods for providing information to our military partners. In any case, passing information to the military is a team effort where OMS, OMW and the Service Intelligence Center NSTs often find themselves leading a coordinated effort.

Through its strategic partnership with JFCOM, participation on the Defense Acquisition Board and many other initiatives large and small, NGA continues to invest in service-oriented activities. These initiatives are aimed at ensuring that the services will indeed be able to organize, train and equip their forces for years to come.

The Expeditionary Fighting Vehicle, the Corps' newest amphibious assault vehicle, sits on Range 100 aboard Marine Corps Air Ground Combat Center Twentynine Palms, Calif., during testing. The EFV enters the operational assessment phase of testing in the near future.



NGA and DoD Look to e-Commerce Model To Transform Warfighting and Disaster Relief

By Air Force Capt. Jeff Carbonetti

Possibly the single most transforming thing in our [armed forces],” Defense Secretary Donald H. Rumsfeld has said, “will not be a weapons system, but a set of interconnections.”

From the perspective of information technology (IT), the way we approach warfare and disaster relief must change significantly. This is especially true when we consider the changes in tactics required by the war on terrorism as well as the need for rapid response to environmental disasters. Success in this environment requires extensive information sharing and collaboration.

The e-commerce world recognized a very similar need to transform as it searched for ways to get in front of its development costs and time to market and to become more agile. This led to a transformation of the Internet from a medium dominated by communications like e-mail to an Internet exploding with life-enhancing services and capabilities. Today’s Internet users purchase books, download music, file taxes, access medical information, share photos, track shipments, and act as their own travel agent. In addition, they can monitor and manage bank accounts, credit transactions and investments in real time.

DCGS and NGA

The military services, NGA and the rest of the Intelligence Community (IC) recognize the potential of these Internet technologies to exponentially improve and enhance our country’s warfighting and disaster-relief capabilities. The military services’ Distributed Common Ground/Surface System

(DCGS) and NGA’s National System for Geospatial-Intelligence (NSG) Transformational Architecture are pioneering this change by transforming to network-centric distributive and collaborative enterprise architectures.

The DCGS enterprise consists of a complex collection of sites, or nodes, that, while geographically distributed, are interconnected via a network. These nodes range from small transportable sites that can operate while disconnected from the rest of the enterprise to large facilities that represent the heart of the enterprise. In the final “to be” state, interoperability between the sites and the capabilities that comprise each site will be based on a common framework known as the DCGS Integration Backbone (DIB).

NGA and the DCGS community have been working since mid-2004 to loosely couple their two enterprises in a way that allows them to share the capabilities of each without impacting their separate development. The significance of this relationship is that each organization is a customer of the other.

DCGS Integration Backbone

The delivery of a DCGS Integration Backbone (DIB) to NGA is a major step in facilitating the coupling between the DCGS and NSG.

The DIB provides the mission platform, common integration infrastructure and enterprise services needed to collaborate across the DCGS enterprise. Compliance with relevant IC standards ensures interoperability between the DCGS and the IC.

A National Guard multi-purpose utility truck brings supplies to the Super Dome in downtown New Orleans after Hurricane Katrina. Experts feel that Internet technologies can enhance our country's disaster-relief capabilities.



The DIB creates a community of interest for intelligence, surveillance and reconnaissance (ISR). With its standards-based approach, the DIB provides access for both existing and newly developed applications for ISR and command and control (C2).

While providing the core infrastructure to share applications, resources and data, the DIB also provides a search capability. Once operators start using the DIB-based construct and new applications are brought online, they will see an explosion in operational capability.

Better, Faster Decision-Making

Based on an e-commerce model called "business-to-business" (B2B), the DIB provides a framework for business transactions by integrating inputs from various stakeholders, such as suppliers, customers and finance.

Across the DCGS enterprise, information will flow faster between ISR nodes, C2 nodes and forward-area commanders as users leverage commercially proven Web technologies. There will be shorter cycle times to produce information and make decisions.

While e-commerce gains are measured in terms of corporate revenue net gains, DCGS gains will be measured by gains on the battlefield and faster, more efficient disaster relief.

NSG Transformation

The NSG Transformational Architecture is NGA's standards-based network-centric

architecture. The current geospatial-intelligence (GEOINT) environment is characterized by separate data collection and processing systems that serve specific users. Interfaces between systems have been developed to satisfy operational needs on a case-by-case basis.

"Creating a common architecture founded on common standards and migrating all legacy systems to [those standards] will significantly improve the effectiveness, productivity and responsiveness of NGA and the broader multi-agency NSG," stated Keith Masback, Chief of NGA's Source Operations Group, in the July 2005 C⁴ISR Journal. "That will make GEOINT more useful to the consumer, from the policymaker to the warfighter to the first responder."

GeoScout, NGA's contract vehicle for acquiring and integrating systems into the NSG, is fielding network-centric capabilities in block upgrades.

Block 1 completes the fielding of the network infrastructure required to operate a collaborative, Web services enterprise, much like Google™ and Google™ groups, by the end of 2006. The Block 1 transformation of the NSG will enable interoperability with other DCGS-based enterprises through the use of standards-based Web services. These Web services will enable a shared common operating picture for unified military, civil and disaster relief operations.

In Block 2, the focus is on integrated source operations. The goal is to provide a user-friendly marketplace where customer collection needs can be readily fulfilled by an ever-increasing number of GEOINT data suppliers. Block 2 capabilities coupled with improved access to GEOINT producers will enable NGA source analysts to improve the collection process as well as improve communications with suppliers.

The NSG transformation will enable NGA to collaboratively plan National Technical Means, airborne and commercial imagery collections. It will also enable NGA to retire collection-management and exploitation workflow tools that were designed to support the gathering of intelligence about former Cold-War adversaries. Imagery source managers will no longer need to manually and methodically analyze, and then approve, the vast majority of their customers' imagery requests. Automated servicing of pro forma imagery requests will eliminate the need for a human in the process in most instances.

Operators will have unprecedented access to imagery through the National Geospatial-Intelligence System and Department of Defense Distributed Common Ground/Surface System (DCGS). Together, the systems will provide a search capability and sharing of real-time imagery from a variety of sources.

Future GeoScout blocks will enable advanced source-exploitation management,

full-stream (higher volume) data processing, and the use of rich spectral-analysis tools through the use of Web services. These capabilities will be combined with NGA's Geospatial Knowledge Base to support, among other capabilities, persistent surveillance, predictive analysis, full-spectrum battle-space awareness and information dominance.

Collaboration with Air Force

With the coupling of the NSG and DCGS enterprises, airborne resources will no longer be isolated to key points, such as airborne cells, but will be readily available to all users and systems within the NSG.

NGA is working with the Air Force to achieve a loose coupling of its DCGS enterprise with the NSG, share lessons learned, and examine software reuse opportunities. As a result of this relationship, the NSG will have unprecedented access to airborne data and services. Users will not have to establish point-to-point interfaces because they will be able to discover airborne intelligence through the NSG and have it side-by-side with other sources. Much as FedEx® customers are able to track packages from order to delivery, NSG users will have complete visibility of the life cycle of their intelligence requests, whether satisfied by airborne or national assets.

With their e-commerce models based on standards for data exchange and commercial IT frameworks for interoperability, the DCGS and NSG communities are leading the IT transformation within DoD and the IC. The shift to Web services and DCGS-based architecture will move the IT landscape within DoD and the IC further and faster than at any time in the last 30 years. Even more, it will change the way operations are conducted by providing the tools necessary to defeat enemies that are difficult to find or get relief faster to those who need help in natural disasters.



Photo courtesy of Raytheon Company

Our Heritage

War Spurs Aerial Reconnaissance Capability

By Benjamin F. Crew Jr.

The period between the World Wars brought great technological improvements to the fields of aviation and photography. The U.S. Army was in the midst of these changes and employed them effectively in the realm of aerial reconnaissance. An American hero of this effort was the Army's George W. Goddard, who invented cameras and reconnaissance systems as well as night-flash photography and near real-time imagery in the 1920s. Goddard's watchword—"There is no substitute for focal length"—remains true even today when focal length has been replaced by pixel density.

But the primary focus of these efforts was on mapping, while the role of extracting intelligence from aerial photography was retained but neglected. Likewise, highly technical equipment designed to extract maximum value from the photographs for mapping purposes was developed—the stereoscopic plotters so familiar to the cartographers of our legacy agencies. It was this equipment that would subsequently also be used to extract vital intelligence from wartime reconnaissance photos. Perhaps first among these was the Wild A-5 Universal Plotting Instrument

employed by the British Royal Air Force (RAF) for stereoscopic analysis of early wartime high-altitude imagery. The Wild (pronounced "Vild") remained a vital tool until longer focal length cameras increased the quality and scale of the photos, but it never became obsolete.

The Second World War and British success with photo intelligence quickly changed the attitude of the U.S. Army Air Corps and the U.S. Navy. Two key advances in aerial reconnaissance and the art and science of photo interpretation (imagery analysis) were strategic targeting and nearly ubiquitous stereoscopic photographic coverage. The first of these was essential to the success of the "revolution in military affairs" brought on by the feasibility of long-range precision bombing. The second permitted the precise identification of key industrial components for targeting as well as the analysis of weapons systems under development (such as the V-1 and V-2 rockets) and the penetration of excellent axis camouflage. And Goddard's night flash photography permitted rapid Bombing (now Battle) Damage Assessment (BDA) reporting. Stereoscopic analysis enabled new intelligence products like detailed models of Axis installations and terrain areas slated for attack.

Among other tools in the photo interpreter's kit bag were the pocket stereoscope (adapted from the pre-television entertainment device of the 1800s by the RAF's Hugh Hamshaw-Thomas in 1800), tube magnifier (a high-magnification monocular lens), precise measuring reticle (originally used in the textile industry to count the threads in woven cloth) and

George W. Goddard shows President Roosevelt some images during World War II. Goddard's inventions significantly improved the field of aerial reconnaissance.

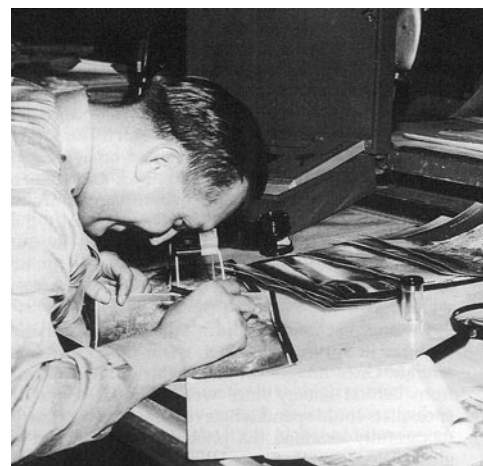


various navigation instruments such as the Weems Plotter and proportional dividers for mission planning. In addition, the back of the scientific slide rule was adapted for photo interpretation, providing scales used for mensuration (photo measurement) and for mission planning.

American photo interpreters came from many backgrounds, but those with Earth sciences and engineering degrees were the most highly sought because they were expected to be the most familiar with viewing objects in the format of aerial photography. Many deployed to Europe in support of President Franklin Roosevelt's and Prime Minister Winston Churchill's "Europe First" policy, both to the Allied Central Interpretation Unit at Medmenham and throughout the theater. But aerial reconnaissance also played a vital role in the Pacific Theater, perhaps more vital, due to the lack of accurate maps of many of the islands and archipelagoes that were the targets of Nimitz's and MacArthur's grinding campaigns against the Japanese Empire's East Asia Co-Prosperity Sphere.



Photo interpreters based at the ACIU begin their workday.



A U.S. officer stationed at the Allied Central Interpretation Unit (ACIU) uses his instruments to analyze aerial photographs.

In the Pacific, U.S. Naval and Air Corps units, who, unlike in Europe, were largely on their own, made maps from mosaics of aerial photographs. These maps served both for invasion planning and tactical use by combat forces. They also employed terrain models to familiarize invasion forces with the terrain and the opposing Japanese forces.

By war's end the United States had developed a truly formidable capability to conduct aerial reconnaissance and to employ the photography acquired to great advantage both in the areas of mapping and intelligence. But as in World War I, that capability was to virtually disappear by the time it was needed again. That was in 1950 when North Korea, encouraged by a bellicose Soviet Union, attacked South Korea, its World War II Peace Treaty-created neighbor.

An imagery analyst with nearly 40 years' experience, Benjamin F. Crew Jr. is a guest columnist in this issue for NGA Historian Dr. Martin K. Gordon.



Partnerships

DIA and NGA Hold First Leadership Quarterly

By Tom Cooke and Larry Danforth

The Directors of the Defense Intelligence Agency (DIA) and NGA and their senior staffs met to chart the future partnership between the two agencies in the first of a planned series of quarterly meetings in March.

Army Lt. Gen. Michael D. Maples, the DIA Director, opened the meeting by noting that the conference was a unique opportunity for the agencies' leadership to communicate with one another and to "place issues on the table." Retired Air Force Lt. Gen. James R. Clapper Jr. noted that a major value of the meeting was actually in the preparation and coordination of the joint presentations.

The first presentation covered NGA support to DIA's all-source intelligence operations. This partnership is actually a long-standing relationship, in which NGA imagery and geospatial analysts and support personnel are fully integrated at eight DIA locations providing GEOINT support to DIA all-source analysis. NGA analysts collaborate daily with DIA all-source analysts on a number of issues, including counterterrorism, orders of battle, medical intelligence and counter-narcotics, to name a few.

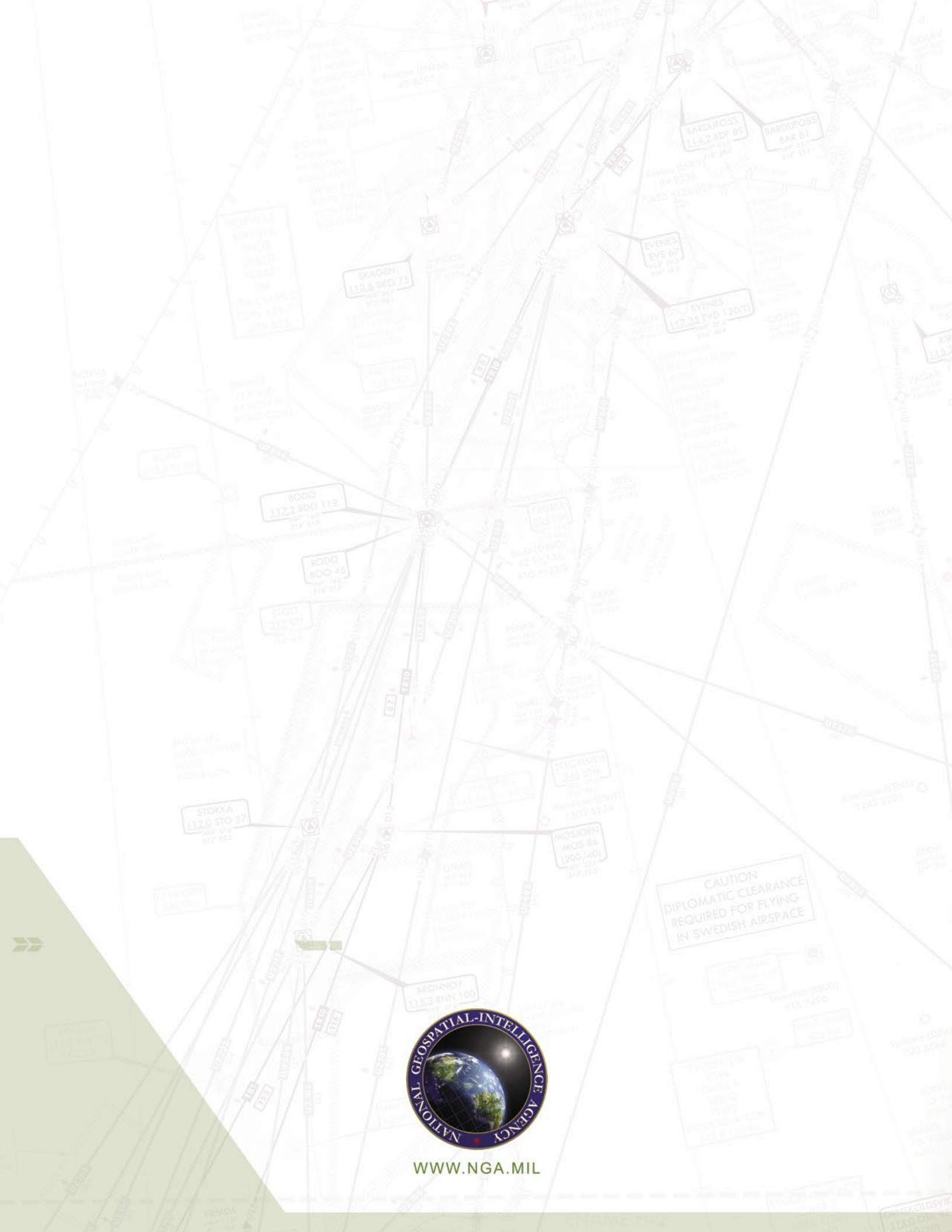
The second presentation provided an overview of the partnership between GEOINT and DIA's human-intelligence (HUMINT) efforts. Specifically, it highlighted a two-way process in which GEOINT facilitates a HUMINT collector's job by providing visual products that ultimately enhance reporting accuracy and timeliness. In turn, NGA's analysts gain the opportunity to fully appreciate HUMINT collectors' constraints and requirements

that ultimately result in their ability to build more relevant GEOINT products in support of the HUMINT effort. The briefing outlined how the two agencies plan to institutionalize a partnership that has heretofore been individual success stories between the two "INTs."

In the third presentation, the agencies' Chief Information Officers (CIOs) outlined ongoing activities between their two organizations. The agencies' CIO leadership, which has been meeting quarterly since last year, is establishing a Joint DIA and NGA CIO Information Technology Forum to pursue such joint actions as standardizing desktop software and Voice over Internet Protocol phone service.

The fourth briefing covered how the two agencies have developed a joint strategic initiative for deployment support. Since DIA and NGA deploy dozens of personnel forward in support of operations in Afghanistan, Iraq and other countries, there are many opportunities for the agencies to partner their deployment support in such areas as medical, weapons, training and logistics.

The last presentation was an update on final preparations to inaugurate the Defense Joint Intelligence Operations Center (DJIOC), which reached initial operational capability in April. DJIOC is the lead intelligence organization for coordinating interagency intelligence support to meet requirements of the combatant commands. The DJIOC will adjudicate defense intelligence requirements across the command and with combat support agencies and field activities.



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